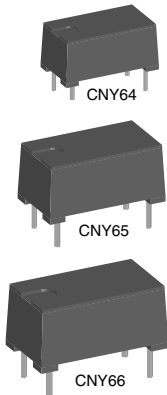
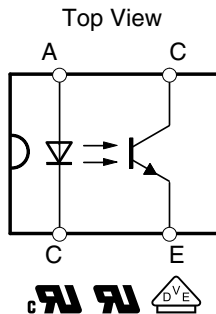




## Optocoupler, Phototransistor Output, Very High Isolation Voltage



17187-4



### FEATURES

- Rated recurring peak voltage (repetitive)  
 $V_{IORM} = 1450 V_{peak}$
- Thickness through insulation  $\geq 3$  mm
- Creepage current resistance according to VDE 0303 / IEC 60112 comparative tracking index: **CTI**  $\geq 200$
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT

### VDE STANDARDS

These couplers perform safety functions according to the following equipment standards:

- DIN EN 60747-5-5 (VDE 0884-5)**  
Optocoupler for electrical safety requirements
- IEC 60950/EN 60950**  
Office machines
- VDE 0804**  
Telecommunication apparatus and data processing
- IEC 60065**  
Safety for mains-operated electronic and related household apparatus
- VDE 0700/IEC 60335**  
Household equipment
- VDE 0160**  
Electronic equipment for electrical power installation
- VDE 0750/IEC60601**  
Medical equipment

### LINKS TO ADDITIONAL RESOURCES



### DESCRIPTION

The CNY64, CNY65, and CNY66 consist of a phototransistor optically coupled to a gallium arsenide infrared-emitting diode in a 4 pin plastic package.

The single components are mounted opposite one another, providing a distance between input and output for highest safety requirements of  $> 3$  mm.

### APPLICATIONS

Circuits for safe protective separation against electrical shock according to safety class II (reinforced isolation):

- for appl. class I to IV at mains voltage  $\leq 300$  V
- for appl. class I to IV at mains voltage  $\leq 600$  V
- for appl. class I to III at mains voltage  $\leq 1000$  V according to DIN EN 60747-5-5 (VDE 0884-5), suitable for:
  - Switch-mode power supplies
  - Line receiver
  - Computer peripheral interface
  - Microprocessor system interface

### AGENCY APPROVALS

- [UL / cUL](#) 1577
- [DIN EN 60747-5-5 \(VDE 0884-5\)](#)

ORDERING INFORMATION			
<div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; padding: 2px;">C</div> <div style="border: 1px solid black; padding: 2px;">N</div> <div style="border: 1px solid black; padding: 2px;">Y</div> <div style="border: 1px solid black; padding: 2px;">6</div> </div> <p>PART NUMBER</p>	<div style="border: 1px solid black; padding: 2px;">#</div> <p>PACKAGE OPTION</p>	<div style="border: 1px solid black; padding: 2px;">x</div> <p>CTR BIN</p>	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>DIP, 400 mil</p> <p>10.16 mm</p> </div> <div style="text-align: center;"> <p>DIP, 600 mil</p> <p>15.24 mm</p> </div> <div style="text-align: center;"> <p>DIP, 700 mil</p> <p>17.8 mm</p> </div> </div>
AGENCY CERTIFIED / PACKAGE	CTR (%)		
<b>UL, cUL, VDE</b>	<b>50 to 300</b>	<b>63 to 125</b>	<b>100 to 200</b>
DIP-4 HV, 400 mil, high isolation distance	CNY64	CNY64A	CNY64B
DIP-4 HV, 600 mil, high isolation distance	CNY65	CNY65A	CNY65B
DIP-4 HV, 700 mil, high isolation distance	CNY66	-	CNY66B



<b>ABSOLUTE MAXIMUM RATINGS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
<b>INPUT</b>				
Reverse voltage		$V_R$	5	V
Forward current		$I_F$	75	mA
Forward surge current	$t_p \leq 10\text{ }\mu\text{s}$	$I_{FSM}$	1.5	A
Power dissipation		$P_{diss}$	120	mW
Junction temperature		$T_j$	100	$^{\circ}\text{C}$
<b>OUTPUT</b>				
Collector emitter voltage		$V_{CEO}$	32	V
Emitter collector voltage		$V_{ECO}$	7	V
Collector current		$I_C$	50	mA
Collector peak current	$t_p/T = 0.5, t_p \leq 10\text{ ms}$	$I_{CM}$	100	mA
Power dissipation		$P_{diss}$	130	mW
Junction temperature		$T_j$	100	$^{\circ}\text{C}$
<b>COUPLER</b>				
Total power dissipation		$P_{tot}$	250	mW
Ambient temperature range		$T_{amb}$	-55 to +85	$^{\circ}\text{C}$
Storage temperature range		$T_{stg}$	-55 to +100	$^{\circ}\text{C}$
Soldering temperature	2 mm from case, $\leq 10\text{ s}$	$T_{sld}$	260	$^{\circ}\text{C}$

**Note**

- Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of this document. Exposure to absolute maximum ratings for extended periods of the time can adversely affect reliability

<b>ELECTRICAL CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>input</b>						
Forward voltage	$I_F = 50\text{ mA}$	$V_F$	-	1.25	1.6	V
Junction capacitance	$V_R = 0, f = 1\text{ MHz}$	$C_j$	-	50		pF
<b>output</b>						
Collector emitter voltage	$I_C = 1\text{ mA}$	$V_{CEO}$	32	-	-	V
Emitter collector voltage	$I_E = 100\text{ }\mu\text{A}$	$V_{ECO}$	7	-	-	V
Collector emitter leakage current	$V_{CE} = 20\text{ V}, I_F = 0\text{ A}$	$I_{CEO}$	-	-	200	nA
<b>coupler</b>						
Collector emitter saturation voltage	$I_F = 10\text{ mA}, I_C = 1\text{ mA}$	$V_{CEsat}$	-	-	0.3	V
Cut-off frequency	$V_{CE} = 5\text{ V}, I_F = 10\text{ mA}, R_L = 100\text{ }\Omega$	$f_c$	-	110	-	kHz
Coupling capacitance	$f = 1\text{ MHz}$	$C_k$	-	0.3	-	pF

**Note**

- Minimum and maximum values are testing requirements. Typical values are characteristics of the device and are the result of engineering evaluation. Typical values are for information only and are not part of the testing requirements

CURRENT TRANSFER RATIO ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
$I_C/I_F$	$V_{CE} = 5\text{ V}$ , $I_F = 10\text{ mA}$	CNY64, CNY65, CNY66	CTR	50	-	300	%
		CNY64A	CTR	63	-	125	%
		CNY65A	CTR	63	-	125	%
		CNY64B	CTR	100	-	200	%
		CNY65B	CTR	100	-	200	%
		CNY66B	CTR	100	-	200	%

SWITCHING CHARACTERISTICS ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Delay time	$V_S = 5\text{ V}$ , $I_C = 5\text{ mA}$ , $R_L = 100\text{ }\Omega$ , (see Fig. 3)	$t_d$	-	2.6	-	$\mu\text{s}$
Rise time	$V_S = 5\text{ V}$ , $I_C = 5\text{ mA}$ , $R_L = 100\text{ }\Omega$ , (see Fig. 3)	$t_r$	-	2.4	-	$\mu\text{s}$
Fall time	$V_S = 5\text{ V}$ , $I_C = 5\text{ mA}$ , $R_L = 100\text{ }\Omega$ , (see Fig. 3)	$t_f$	-	2.7	-	$\mu\text{s}$
Storage time	$V_S = 5\text{ V}$ , $I_C = 5\text{ mA}$ , $R_L = 100\text{ }\Omega$ , (see Fig. 3)	$t_s$	-	0.3	-	$\mu\text{s}$
Turn-on time	$V_S = 5\text{ V}$ , $I_C = 5\text{ mA}$ , $R_L = 100\text{ }\Omega$ , (see Fig. 3)	$t_{on}$	-	5	-	$\mu\text{s}$
Turn-off time	$V_S = 5\text{ V}$ , $I_C = 5\text{ mA}$ , $R_L = 100\text{ }\Omega$ , (see Fig. 3)	$t_{off}$	-	3	-	$\mu\text{s}$
Turn-on time	$V_S = 5\text{ V}$ , $I_F = 10\text{ mA}$ , $R_L = 1\text{ k}\Omega$ , (see Fig. 4)	$t_{on}$	-	25	-	$\mu\text{s}$
Turn-off time	$V_S = 5\text{ V}$ , $I_F = 10\text{ mA}$ , $R_L = 1\text{ k}\Omega$ , (see Fig. 4)	$t_{off}$	-	42.5	-	$\mu\text{s}$

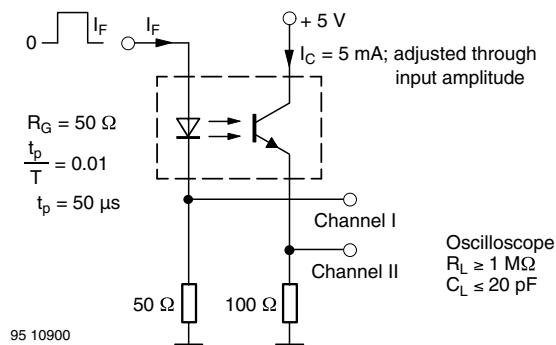


Fig. 1 - Test Circuit, Non-Saturated Operation

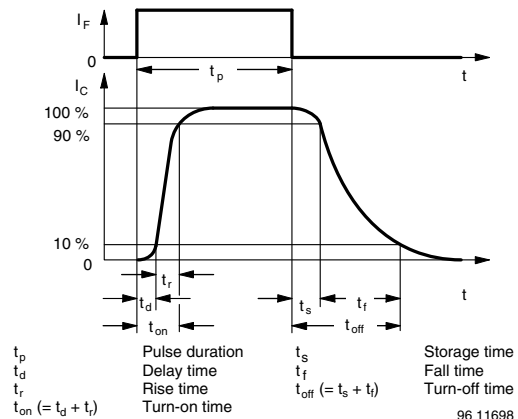


Fig. 3 - Switching Times

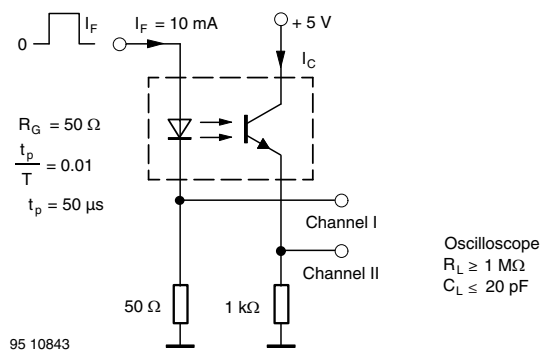


Fig. 2 - Test Circuit, Saturated Operation

SAFETY AND INSULATION RATED PARAMETERS				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Climatic classification	According to IEC 68 part 1		55 / 85 / 21	
Pollution degree	According to DIN VDE 0109		2	
Comparative tracking index	Insulation group IIIa	CTI	200	
Maximum rated withstanding isolation voltage	According to UL1577, t = 1 min	$V_{ISO}$	8200	$V_{RMS}$
Tested withstanding isolation voltage	According to UL1577, t = 1 s	$V_{ISO}$	13 900	$V_{peak}$
Maximum transient isolation voltage	According to DIN EN 60747-5-5	$V_{IOTM}$	12 000	$V_{peak}$
Maximum repetitive peak isolation voltage	According to DIN EN 60747-5-5	$V_{IORM}$	1450	$V_{peak}$
Isolation resistance	$T_{amb} = 25\text{ }^{\circ}\text{C}$ , $V_{IO} = 500\text{ V}$	$R_{IO}$	$\geq 10^{12}$	$\Omega$
	$T_{amb} = 100\text{ }^{\circ}\text{C}$ , $V_{IO} = 500\text{ V}$	$R_{IO}$	$\geq 10^{11}$	$\Omega$
	$T_{amb} = TS$ , $V_{IO} = 500\text{ V}$	$R_{IO}$	$\geq 10^9$	$\Omega$
Output safety power		$P_{SO}$	250	mW
Input safety current		$I_{SI}$	120	mA
Input safety temperature		$T_S$	150	$^{\circ}\text{C}$
Creepage distance	CNY64		$\geq 9.5$	mm
Clearance distance			$\geq 9.5$	mm
Creepage distance	CNY65		$\geq 14$	mm
Clearance distance			$\geq 14$	mm
Creepage distance	CNY66		$\geq 17$	mm
Clearance distance			$\geq 17$	mm
Insulation thickness		DTI	$\geq 3$	mm
Input to output test voltage, method B	$V_{IORM} \times 1.875 = V_{PR}$ , 100 % production test with $t_M = 1\text{ s}$ , partial discharge < 5 pC	$V_{PR}$	3375	$V_{peak}$
Input to output test voltage, method A	$V_{IORM} \times 1.6 = V_{PR}$ , 100 % sample test with $t_M = 10\text{ s}$ , partial discharge < 5 pC	$V_{PR}$	2880	$V_{peak}$

**Note**

- According to DIN EN 60747-5-5. This optocoupler is suitable for safe electrical isolation only within the safety ratings. Compliance with the safety ratings shall be ensured by means of suitable protective circuits

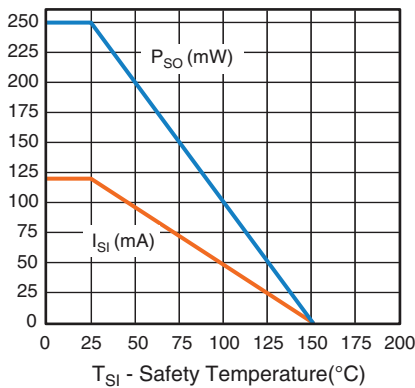


Fig. 4 - Safety Derating Diagram

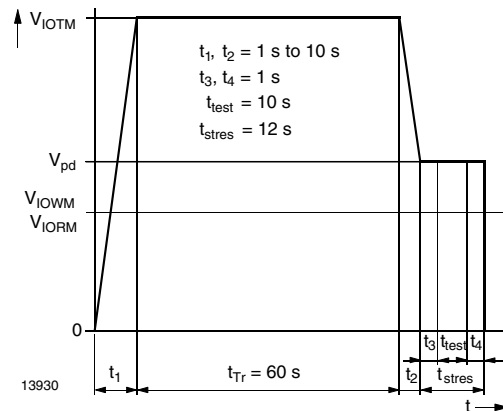


Fig. 5 - Test Pulse Diagram for Sample Test According to DIN EN 60747-5-5 (VDE 0884-5); IEC60747-5-5



TYPICAL CHARACTERISTICS (T<sub>amb</sub> = 25 °C, unless otherwise specified)

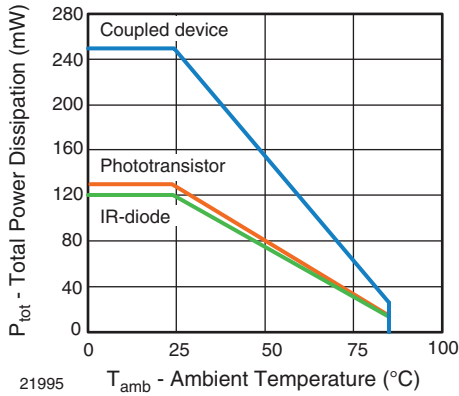


Fig. 6 - Total Power Dissipation vs. Ambient Temperature

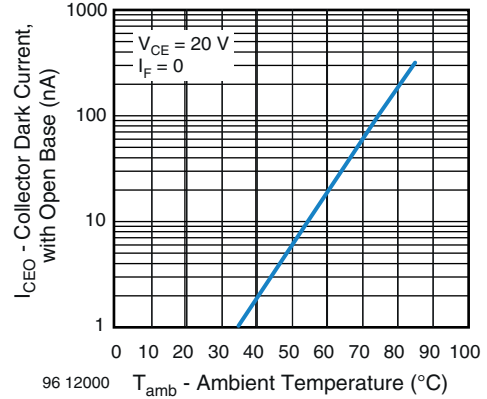


Fig. 9 - Collector Dark Current vs. Ambient Temperature

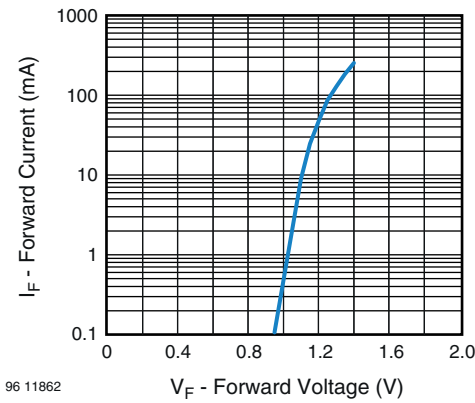


Fig. 7 - Forward Current vs. Forward Voltage

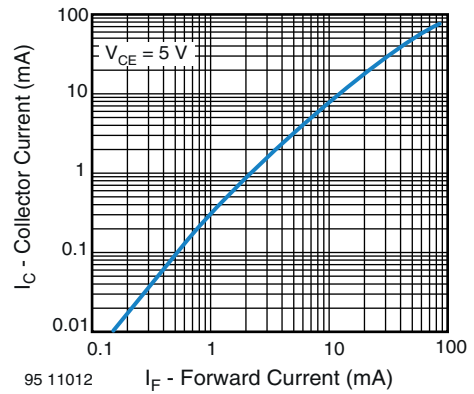


Fig. 10 - Collector Current vs. Forward Current

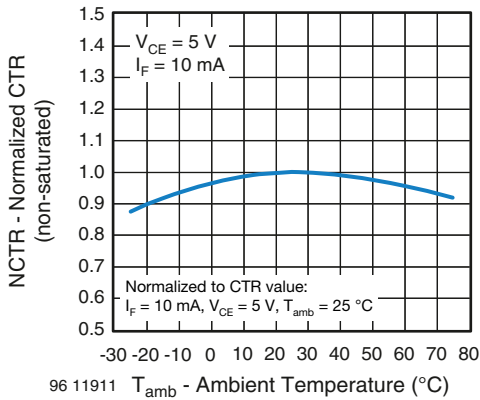


Fig. 8 - Normalized CTR (non-saturated) vs. Ambient Temperature

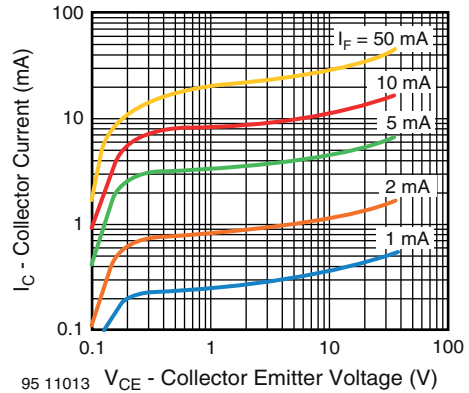


Fig. 11 - Collector Current vs. Collector Emitter Voltage

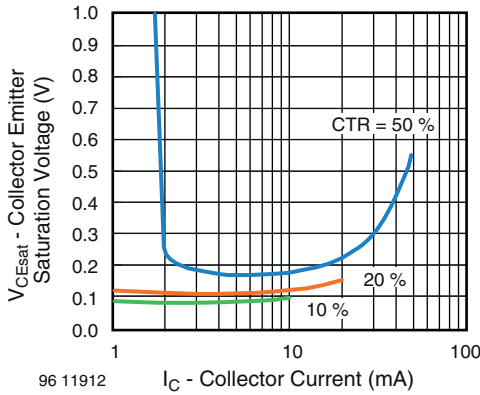


Fig. 12 - Collector Emitter Saturation Voltage vs. Collector Current

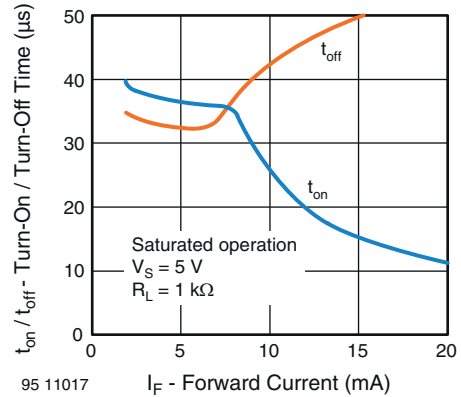


Fig. 14 - Turn-on / Turn-off Time vs. Collector Current

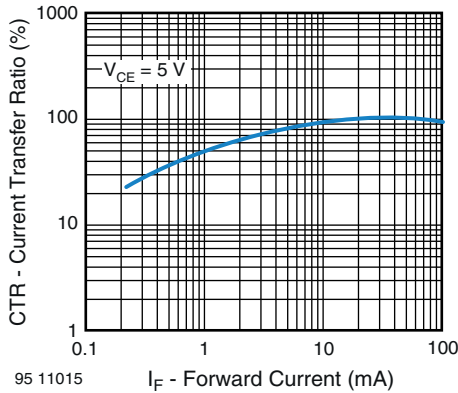


Fig. 13 - Current Transfer Ratio vs. Forward Current

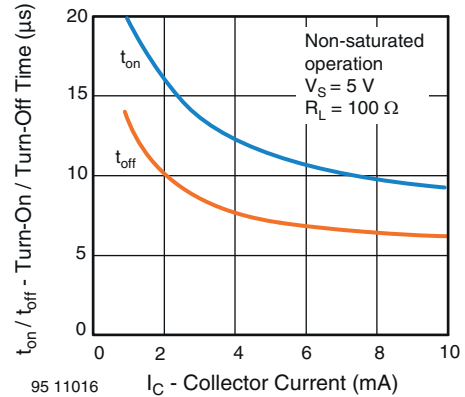
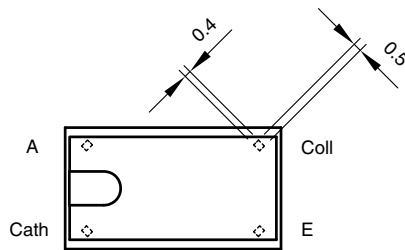
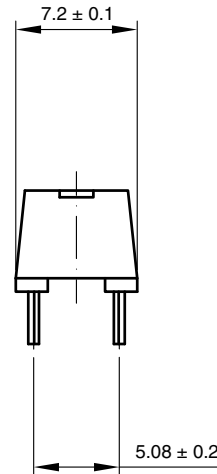
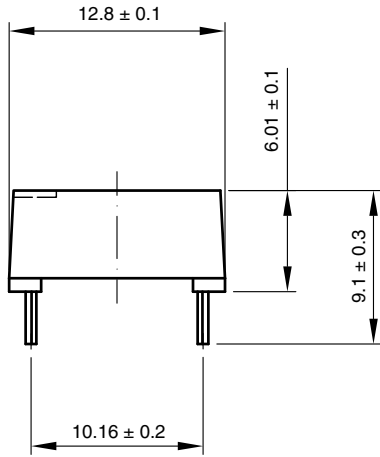


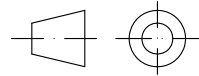
Fig. 15 - Turn-On / Turn-Off Time vs. Forward Current



## PACKAGE DIMENSIONS in millimeters FOR CNY64



Weight: ca. 0.73 g

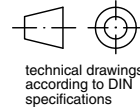
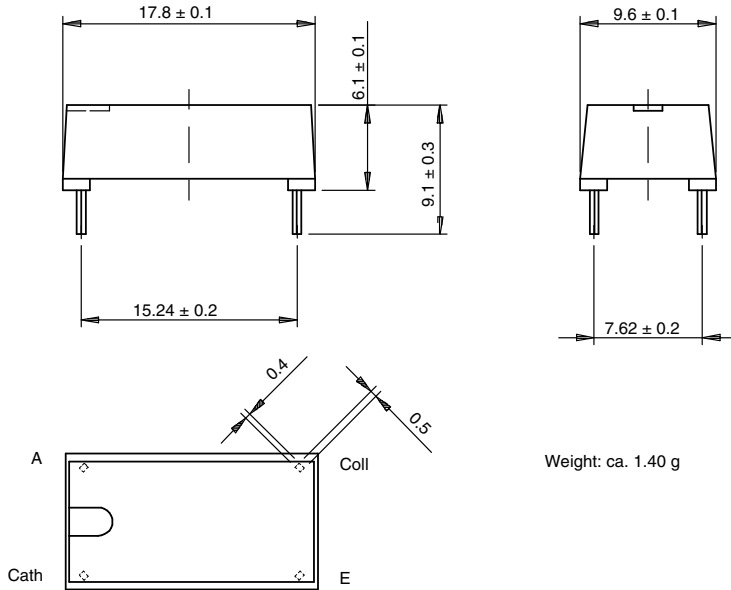


technical drawings according to DIN specifications

Drawing-No.: 6.544-5038.01-4  
Issue: 2; 10.11.98  
14765



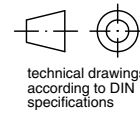
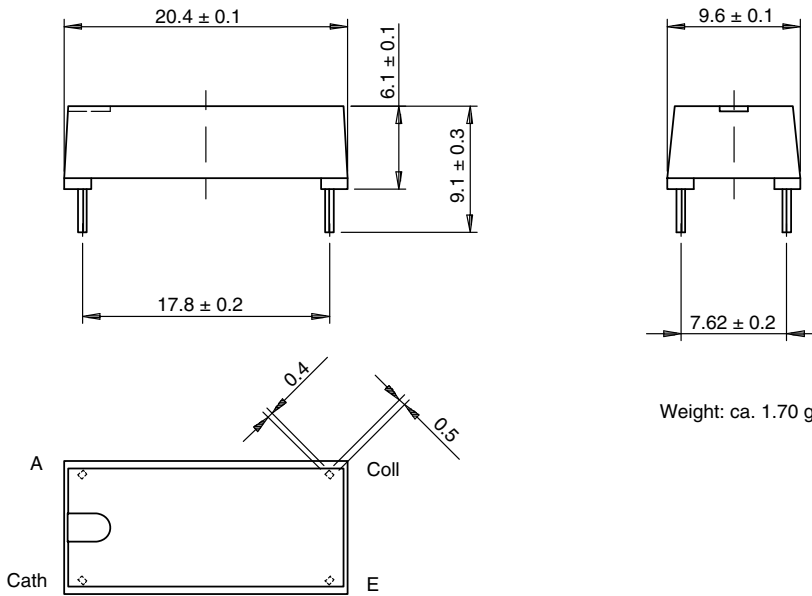
## PACKAGE DIMENSIONS in millimeters FOR CNY65



Weight: ca. 1.40 g

Drawing-No.: 6.544-5036.01-1  
Issue: 2; 10.11.98  
14763

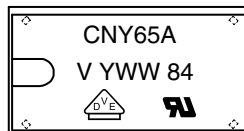
## PACKAGE DIMENSIONS in millimeters FOR CNY66



Weight: ca. 1.70 g

Drawing-No.: 6.544-5037.01-4  
Issue: x; 10.11.98  
14764

## PACKAGE MARKING (example of CNY65A)





TUBE INFORMATION			
TYPE	UNITS/TUBE	TUBES/BOX	UNITS/BOX
CNY64	40	50	2000
CNY65	30	35	1050
CNY66	25	35	875

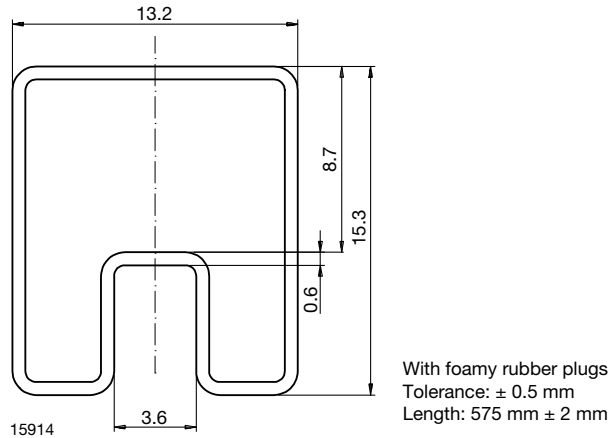
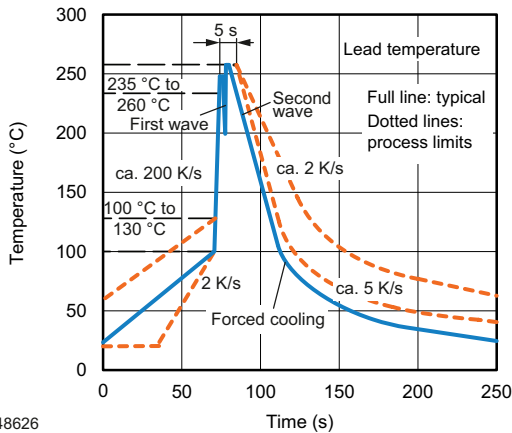


Fig. 16 - Tube Dimensions

**SOLDER PROFILES**



948626

Fig. 17 - Wave Soldering Double Wave Profile According to J-STD-020 for Through-Hole Devices

**HANDLING AND STORAGE CONDITIONS**

- ESD level: HBM class 2
- Floor life: unlimited
- Conditions:  $T_{amb} < 30\text{ °C}$ ,  $RH < 85\%$
- Moisture sensitivity level 1, according to J-STD-020



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